A SYSTEMS APPROACH TO EXPLORING SUSTAINABLE SOLUTIONS: WATER RESOURCES, ECOSYSTEM SERVICES AND OPTIONS

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Many regions and municipalities in the United States are challenged by a deteriorating water infrastructure that can compromise water quality, public health, and recreational amenities. At the same time, the health of many watersheds is jeopardized by excessive releases of nutrients from agriculture, wastewater treatment, and other sources, which cause algal blooms that degrade or destroy aquatic ecosystems. Due to wide regional variations in economic, geographic, and climatic conditions there is no universal approach to protecting water resources from the challenges of decaying infrastructure and rising nutrient impairment. Moreover, effective interventions require cooperation across a multitude of local jurisdictions and stakeholder groups, including government, business, and community organizations. To develop practical solutions, it is necessary to understand the intricate linkages among water and energy resources, human health, ecosystem functions, and commercial activities.

The speaker will describe progress at U.S. EPA's Office of Research and Development in applying sustainability science to integrate environmental, economic, and social issues at a watershed scale. This "systems approach" is based on dynamic, interactive modeling tools that have been used to analyze energy and environmental policies in the State of Ohio. These innovative tools enable investigation of alternative strategies aimed at creating a resilient system of water resources that serves the needs of a growing population with a minimal ecological footprint. Potential strategies include utilization of "green infrastructure," alternative water supply systems to reduce potable water consumption, water quality protection through stormwater management, and mitigation of nutrient releases through improved industrial technologies and practices.

Analysis of these opportunities should evaluate not only affordability and effectiveness, but also the potential for indirect consequences such as increased greenhouse gas emissions or displacement of jobs. EPA is currently applying this approach to develop practical, sustainable solutions for the problem of reducing nutrient impairment in coastal watersheds while meeting societal and economic needs of affected communities. Examples from projects in New England, the mid-Atlantic, and the northwestern US will be discussed.

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